Crop & Food Research Confidential Report No. 1709

Survey of growers of Asian brassicas – results and analysis

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August 2006

A report prepared for
Horticulture NZ

Copy 12 of 12 (Series II)

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Contents

1 Executive summary

Crop & Food Research conducted a survey of growers of Asian brassica crops in 2005-06 to assess the current status of the industry in terms of production area, major pests and diseases, and awareness and adoption of integrated pest management (IPM).

Very little information is currently available on the status and importance of pests and diseases of Asian brassica crops grown in New Zealand, or the pest management practices followed by their growers.

Of the 66 questionnaires mailed out to growers, 20 useable questionnaires were returned (representing a 30% response rate). Most growers (65%) had been growing Asian brassicas for more than five years. The average Asian brassica farm, or area grown by a market gardener, was relatively small (1–5 ha). The most commonly grown Asian brassicas are bok choy (pak choi) and Chinese cabbage (wong bok).

The survey revealed that several diseases and insect pests caused significant economic losses in Asian brassicas. Clubroot and downy mildew were the worst diseases, and diamondback moth and aphids were the worst insect pests. The majority of growers scouted their crops for pests and diseases at least once a week, and based their pest and disease control decisions on scouting information. Sixty percent of Asian brassica growers were aware of the IPM programme for vegetable brassicas.

The findings presented in this report provide Horticulture New Zealand, growers and research providers with a basis for identifying research directions to support the Asian brassica industry in the future.

2 Introduction

In recent years there has been an increase in the range and volume of Asian vegetable cultivars grown in New Zealand for local consumption. Approximately 50–60 growers of Asian brassicas sell fresh produce in New Zealand. Asian brassicas are sold through road-side or farm stands, farmers' markets, retail grocery stores, and restaurants. Very little information is currently available on the status and importance of pests and diseases of Asian brassica crops in New Zealand or the pest management practices adopted by Asian brassica growers.

Pests and diseases can completely destroy crops. Effective control of these problems has traditionally been achieved using very heavy pesticide inputs. However, this situation is changing rapidly. The passage of the Hazardous Substances and New Organisms Act 1996 and the Food Act 1981 (and the

Food Regulations 1984) has meant that pesticide use must significantly reduce, maximum residue limits for pesticides have been set, and certain pesticides have been withdrawn from use. Resistance of some pests and pathogens to commonly used pesticides is becoming an increasingly important problem in horticultural crops. For example, diamondback moth (DBM) is a very serious brassica pest worldwide. It can quickly become resistant to any and all toxins used against it. In New Zealand, DBM is known to be resistant to the two major groups of broad-spectrum insecticides, synthetic pyrethroids and organophosphates. Few alternative insecticides are available. Because of these issues, more growers are considering adopting integrated pest management (IPM) as a viable pest and disease management option.

Integrated pest management is reducing pesticide inputs in production of vegetable brassicas. High pesticide costs and consumer demand for brassicas grown with fewer pesticides are reasons for IPM being employed by an increasing number of growers of horticultural crops. IPM methods help increase returns to growers by reducing the costs of crop production and helping to ensure high-quality, minimum-pesticide produce.

IPM methods need to be adapted for Asian brassicas to ensure that the DBM insecticide resistance management strategy developed for other vegetable brassicas applies to these species. Asian brassicas also have particular pest and disease problems that currently require heavy pesticide applications.

The vegetable brassica industry has initiated a project to update IPM for vegetable brassicas by revising *Integrated Pest Management for Vegetable Brassicas* (the *IPM Manual*). The project team includes grower groups from the major vegetable brassica-producing regions – Pukekohe, Gisborne and Manawatu/Horowhenua. Horticulture New Zealand (formerly Vegfed), the agrichemical industry and other industry partners are supporting this MAF Sustainable Farming Fund project. One objective of the brassica IPM project was to survey growers to determine the occurrence and economic importance of pests and diseases of Asian brassicas in New Zealand.

The objective of this report is to summarise information about pests and diseases on Asian brassicas gathered during a survey. This information describes the pest management practices followed by New Zealand growers of Asian brassicas. It can be used to evaluate the potential impact of IPM on these crops, and provide insight into the types of research needed to meet the needs of the Asian brassica industry in the future.

3 Method

Sixty-six New Zealand growers of Asian brassicas were surveyed by mail about pest and disease problems they had experienced in their crops and pesticide use during the 2004-05 growing season. The contact details of the growers were supplied by Turners and Growers Ltd and MG Marketing. An introductory letter (Appendix I) and a four-page survey questionnaire (Appendix II) were sent to potential survey recipients on 1 August 2005. Responses to the survey were confidential and a self-addressed stamped envelope was enclosed in which the completed survey form was to be

returned. A reminder was sent in October 2005. By the end of 2005, 20 of the 66 questionnaires had been completed and returned (representing a 30% response rate).

The survey questionnaire contained 20 questions, ranging from simple yes/no responses to detailed responses on cropping area, main pests and diseases, crop losses caused by pests and diseases, use of crop scouting, and decision-making processes involved in pest and disease control strategies.

4 Results

Responses to each question in the questionnaire are presented in numerical order. Where growers were given one option for a particular question, the corresponding results graph shows the response expressed as the number of growers responding. Where growers were given several options for a particular question, the corresponding results graph illustrates responses for each option expressed as the percentage of the total number of growers responding.

Question 1: How long have you been growing Asian brassicas?

Of the 20 growers responding, 8 (40%) had grown Asian brassicas for more than 10 years (Figure 1). Four growers (20%) were 'new' to Asian brassicas, having grown the crops for less than 2 years.

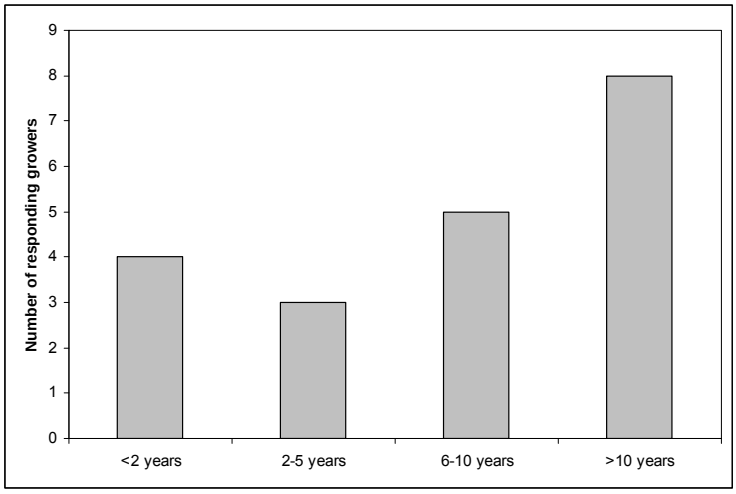

Figure 1: Number of years for which respondents had been growing Asian brassicas.

Question 2: What was the total area in Asian brassicas last season?

The survey revealed that the size of Asian brassica farms in New Zealand is quite small. Of the responding farms, only 4 (20%) were larger than 5 ha (Figure 2). Most farms (75%) grew 1–5 ha of Asian brassicas, and only 1 farm (5%) grew less than 1 ha.

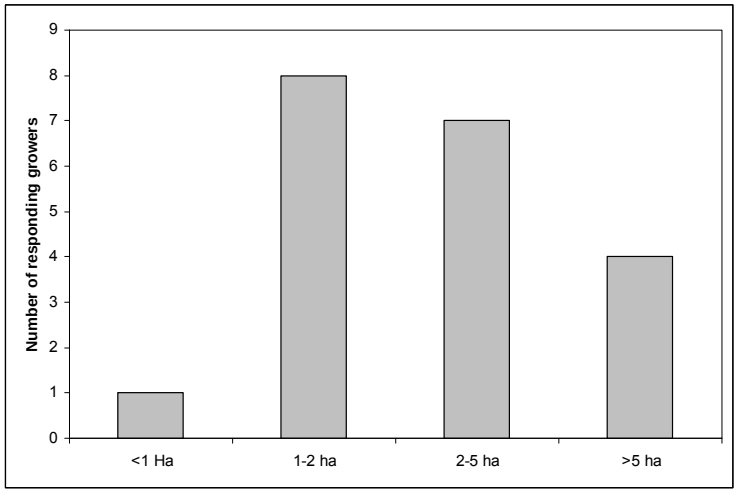

Figure 2: Total area (ha) that responding growers had in Asian brassicas during the 2004-05 season.

Question 3: What Asian brassica crops were grown last season?

Last season, bok choy (pak choi) was the main Asian brassica crop grown by responding growers (Figure 3). Seventeen growers (85%) grew bok choy, 14 (70%) grew Chinese cabbage (wong bok), 7 (35%) grew choi sum, and 3 (15%) grew Chinese broccoli.

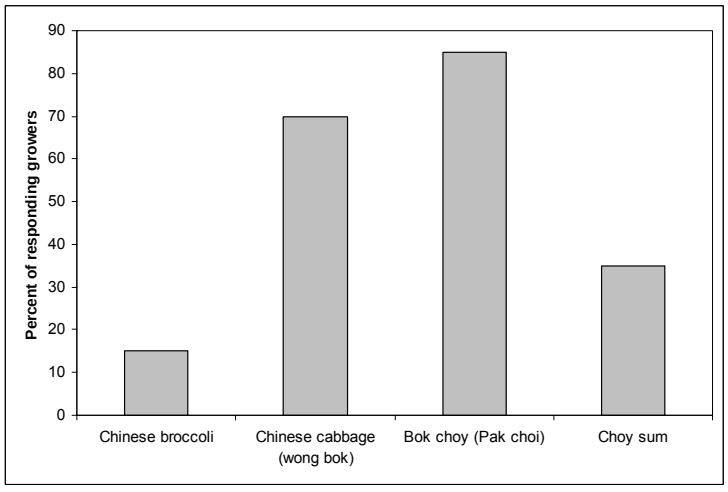

Figure 3: Asian brassica crops grown by responding growers last season.

Question 4: Do you monitor your Asian brassica crops for diseases and pests?

All responding growers monitor their Asian brassica crops for pests and diseases (Figure 4). One grower also monitors crops for bird damage, and another grower monitors plants for nutrient disorders.

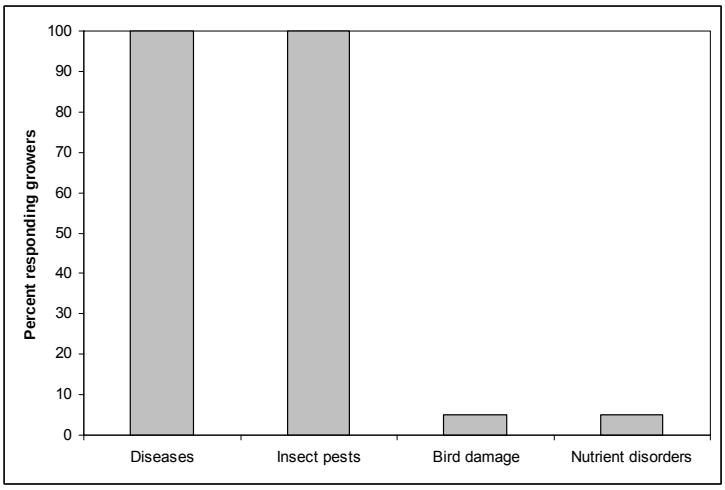

Figure 4: Percent responding growers who monitor their Asian brassica crops for pests and diseases.

Question 5: What are the five most prevalent diseases normally seen in your Asian brassicas?

Figure 5 indicates that several diseases are often seen by responding growers in their Asian brassica crops. Clubroot and downy mildew were rated as the most prevalent diseases (each by 60% of growers), followed by bacterial leaf spot (35% of growers) and ringspot (30% of growers).

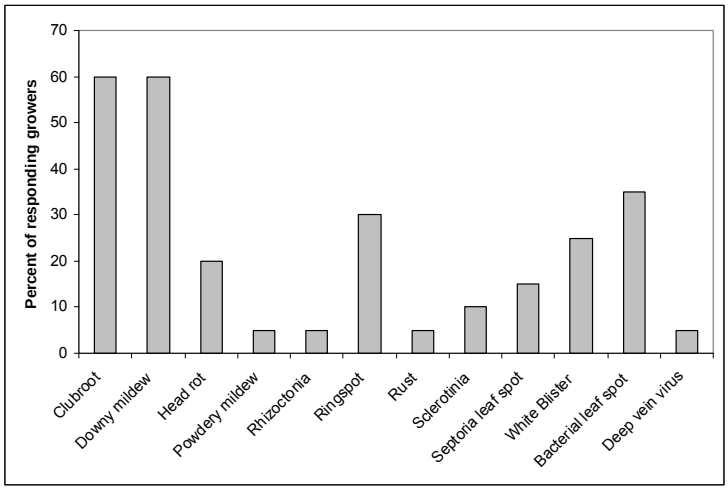

Figure 5: The most prevalent diseases normally seen by responding growers in their Asian brassica crops.

Question 6: What was the approximate crop damage caused by diseases last season?

When head rot occurred it caused severe damage (mean 18% crop damage) to Asian brassicas (Figure 6). Growers reported that ringspot, Septoria leaf spot, white blister and bacterial leaf spot caused serious (>10%) crop damage.

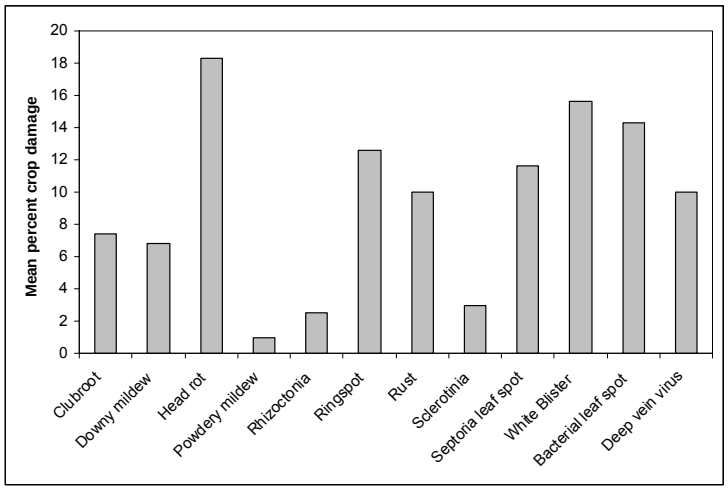

Figure 6: Approximate damage to Asian brassica crops observed last season by responding growers who had experienced the particular disease in their crops.

Question 7: Which diseases did you try to prevent or try to control in your Asian brassicas?

Responding growers did not attempt to control all major diseases of Asian brassicas, but rather applied control measures against the diseases normally seen in their crops, or in response to diseases when they became a problem. For this reason Figure 7 is somewhat similar to the data presented on the most prevalent diseases shown in Figure 5. For clubroot, downy mildew, ringspot and bacterial leaf spot 35–45% of responding growers applied agrichemicals to control the diseases (Figure 7).

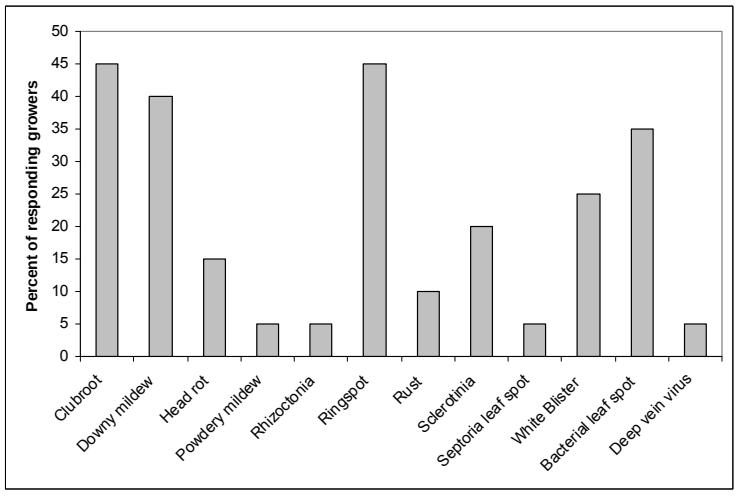

Figure 7: Diseases of Asian brassicas that responding growers attempted to control last season.

Question 8: Which diseases are the most difficult to control in your Asian brassicas?

Clubroot was identified by 35% of responding growers as being the most difficult disease to control (Figure 8). Other diseases that growers found difficult to control included downy mildew, ringspot and bacterial leaf spot.

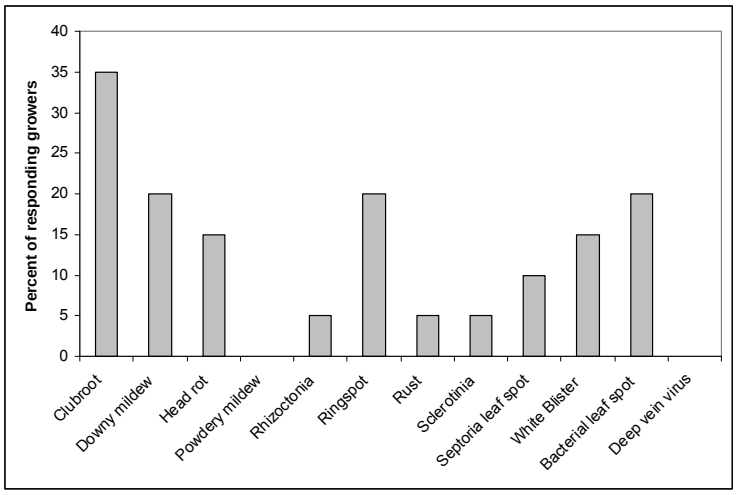

Figure 8: Diseases of Asian brassicas that responding growers found difficult to control.

Question 9: What are the five most prevalent insect pests normally seen in your Asian brassicas?

Several insect pests are often seen by Asian brassica growers in their crops. Diamondback moth, white butterfly, and aphids were rated by responding growers of Asian brassicas as the most prevalent insect pests (by 60, 55, and 50% of responding growers respectively, Figure 9).

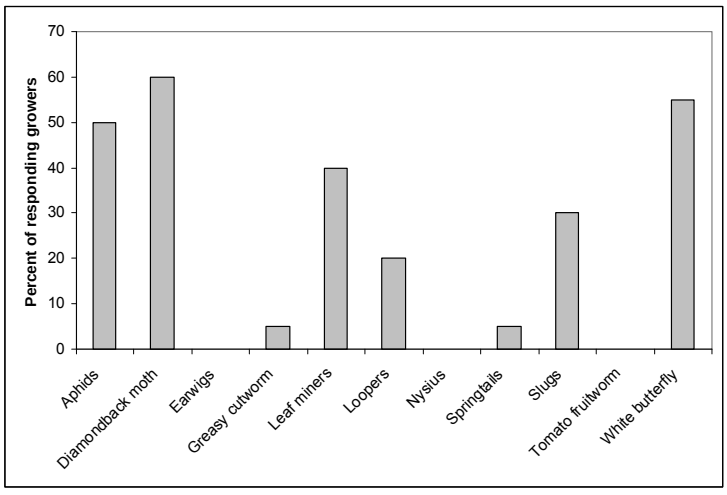

Figure 9: The most prevalent insect pests normally seen by responding growers in their Asian brassica crops.

Question 10: What was the approximate crop damage caused by insect pests last season?

Where leaf miners occurred, they caused moderate crop loss (mean 10% crop damage) to Asian brassicas (Figure 10). Other insect pests that growers identified as causing damage (5–10%) crop were aphids, DBM, loopers and slugs.

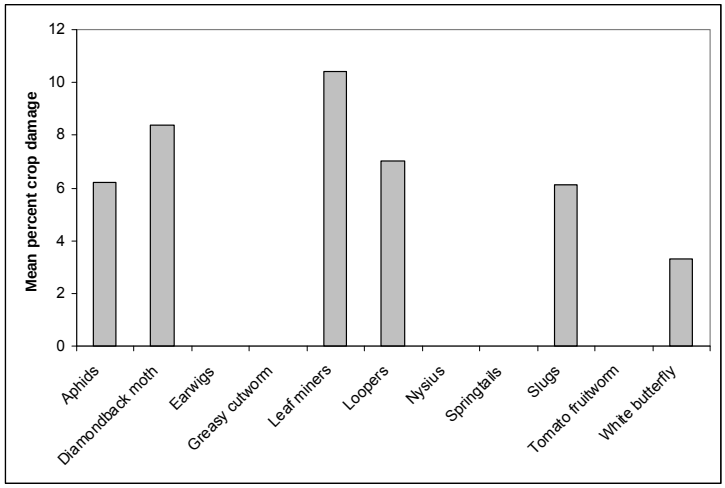

Figure 10: Approximate damage to Asian brassica crops observed last season by responding growers who had experienced the particular insect pest in their crops.

Question 11: Which insect pests did you try to prevent or try to control in your Asian brassicas?

Responding growers did not attempt to control all major insect pests of Asian brassicas, but rather applied control measures against the pests normally seen in their crops, or in response to pests when they became a problem. White butterfly, aphids, DBM and slugs were the pests targeted most for control (Figure 11). Responding growers also applied insecticides to control leaf miners and loopers (40 and 35% of growers respectively).

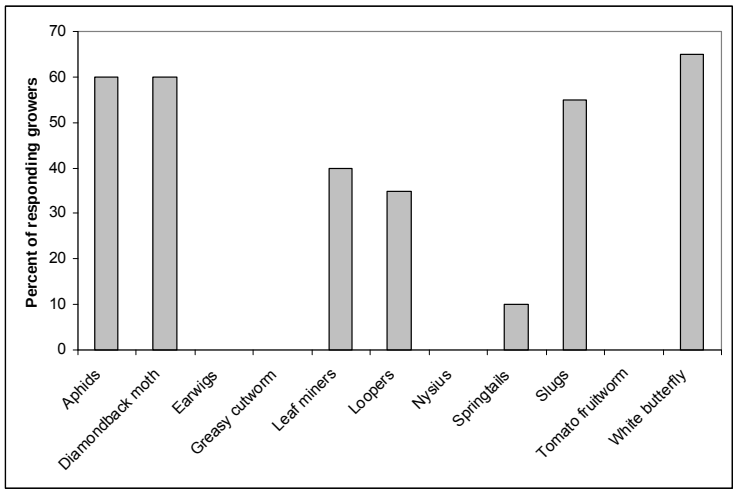

Figure 11: Insect pests of Asian brassicas that responding growers attempted to control during the 2004-05 season.

Question 12: Which insect pests are the most difficult to control in your Asian brassicas?

Slugs were identified by 35% of responding growers as being the most difficult pest to control (Figure 12). Growers also found DBM and aphids difficult to control.

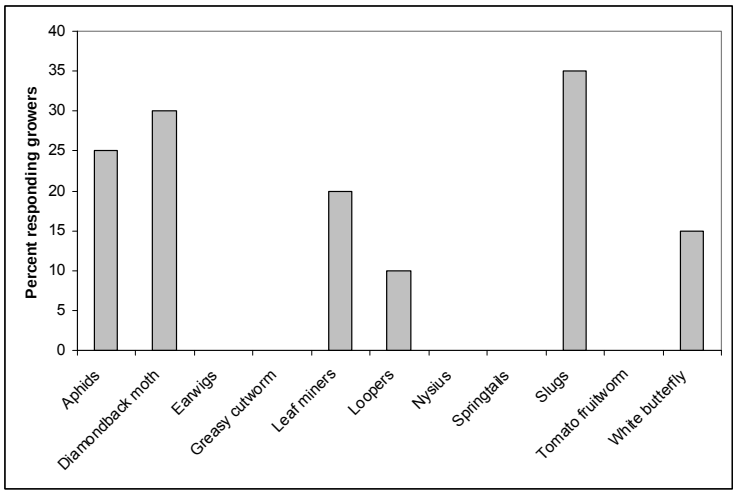

Figure 12: Insect pests of Asian brassicas that responding growers found difficult to control.

Question 13: Did you scout your crops for pests and/or diseases?

All responding growers, except for one, routinely scouted their crops for pests and diseases (Figure 13).

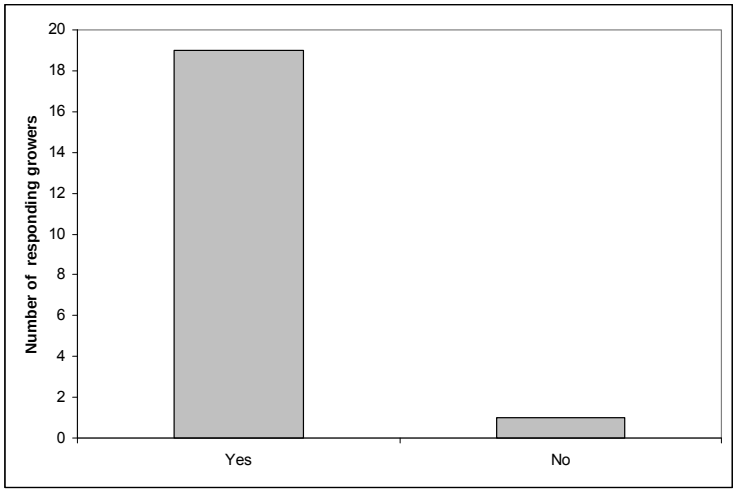

Figure 13: Numbers of growers who routinely scouted for pests and diseases.

Question 14: If you scouted your crops for pest and/or diseases, how often did you scout?

Almost all of the responding growers routinely scouted their crops for pest and diseases at least once a week (Figure 14). One grower scouted fortnightly.

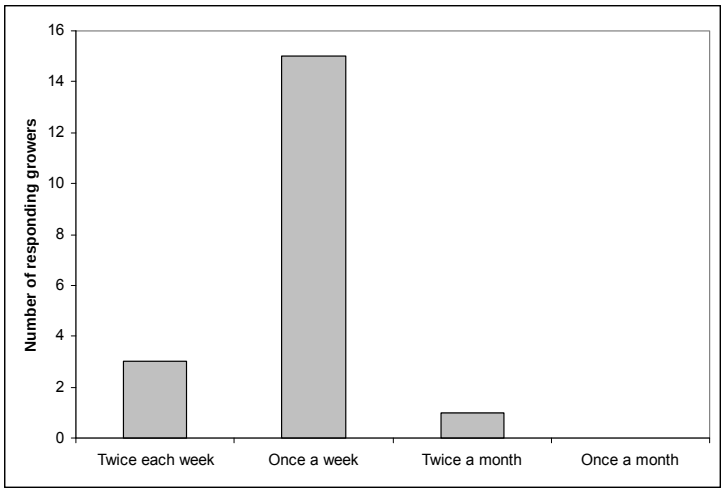

Figure 14: Frequency with which responding Asian brassica growers scouted their crops for pests and diseases.

Question 15: Were decisions to control pests/diseases based on scouting information?

A clear majority of responding growers (18 out of 20) stated that measures to control pests and diseases were implemented in response to information produced during scouting (Figure 15).

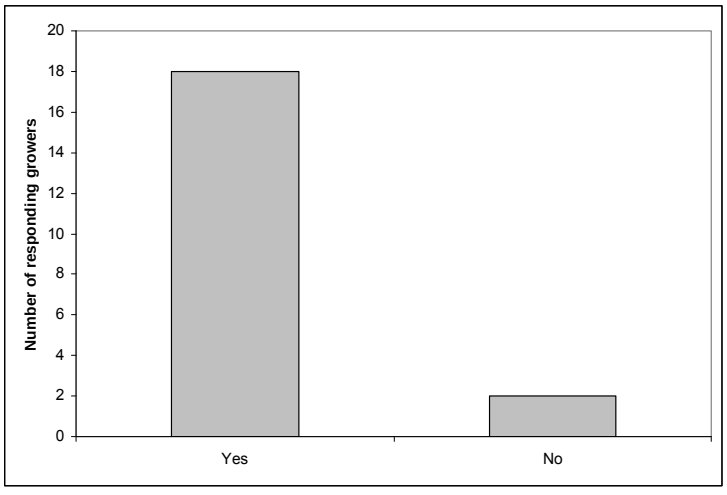

Figure 15: Number of responding growers of Asian brassicas whose decisions to control pests/diseases were based on scouting information.

Question 16: If decisions to control pests/diseases were based on scouting information, was the decision to control based on the presence of a pest/disease, or on a pest/disease threshold?

When decisions to control pests/diseases were based on scouting information (18 responding growers), 13 growers applied control measures when the pest/disease was seen in the crop, and 5 growers applied agrichemicals when a pest/disease threshold was reached (Figure 16).

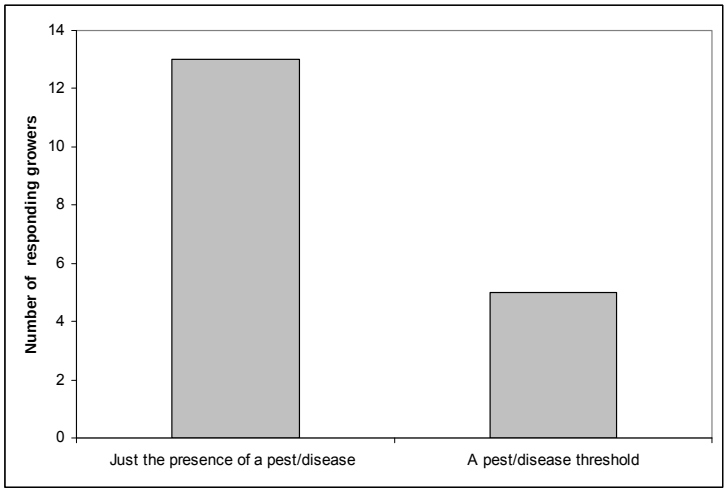

Figure 16: Numbers of responding growers who, if decisions to control pests/diseases were based on scouting information, applied control measures based on the presence of a pest/disease, or in response to a pest/disease threshold.

Question 17: If decisions to control pests/diseases were not based on scouting information, what were the reasons for deciding to take action to control a disease or pest?

The two responding growers of Asian brassicas whose pest and disease control programmes were not based on scouting information said they carried out regular preventive insecticide and fungicide applications.

Question 18: If you sprayed for caterpillar pests, did you use the insecticide rotation strategy for diamondback moth?

Most of the responding growers (16 out of 20) stated that when they sprayed for caterpillars, they used the insecticide rotation strategy for DBM (Figure 17).

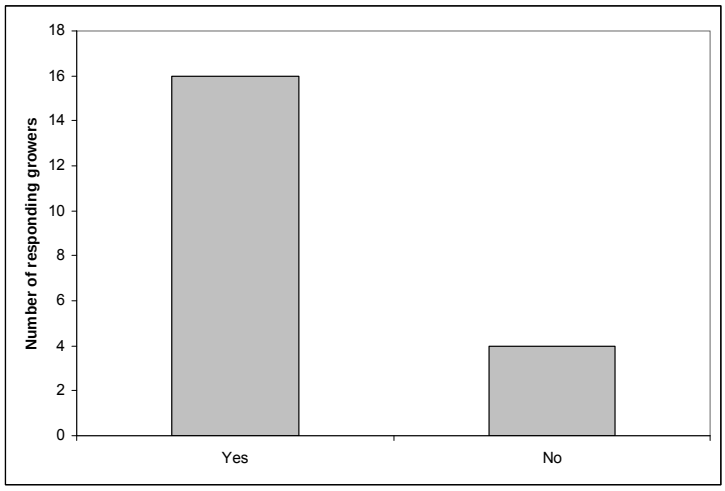

Figure 17: Number of responding growers who used the insecticide rotation strategy for diamondback moth when spraying for caterpillars.

Question 19. Have you heard about the IPM (integrated pest management) programme for vegetable brassicas?

Twelve responding growers were aware of the IPM programme for vegetable brassicas, eight growers had not heard about the vegetable brassica IPM programme (Figure 18).

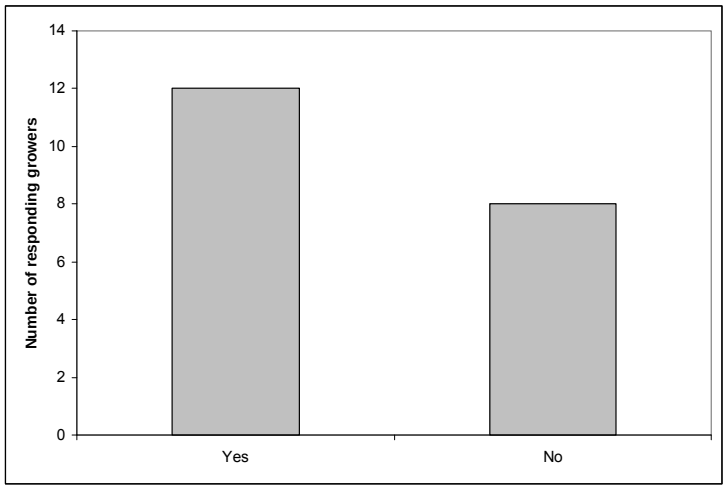

Figure 18: Number of responding growers who were aware of the IPM programme for vegetable brassicas.

Question 20: Do you use the IPM programme?

Of the 12 responding growers who were aware of the IPM programme for vegetable brassicas, 8 use the programme (Figure 19). The other four growers who were aware of the brassica IPM programme did not use it, like the eight growers who had not heard about the programme.

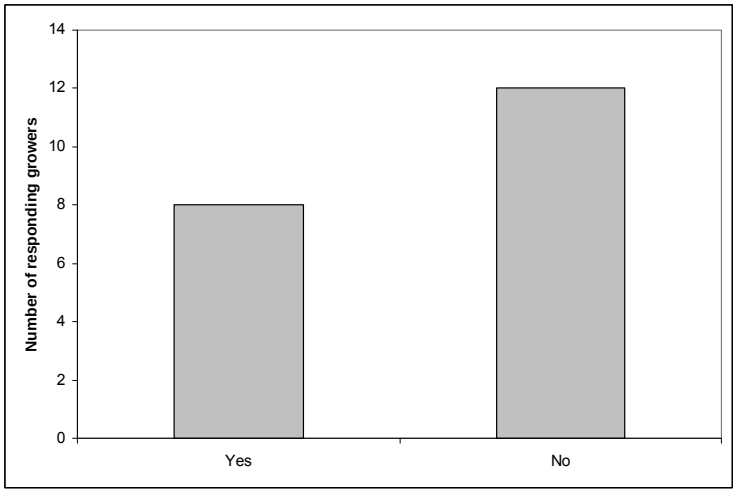

Figure 19: Number of responding growers who use the IPM programme for vegetable brassicas.

Appendices

Appendix I Letter introducing the survey to growers

New Zealand Institute for Crop & Food Research Limited
A Crown Research Institute

CROP & FOOD RESEARCH
Mana Kai Rangahau

1 August 2005

Dear Sir

I am involved in the VegFed/MAF project titled *Advancing integrated pest management (IPM) for vegetable brassicas.* This project aims to update the existing IPM manual for vegetable brassicas.

We will be revising all sections of the manual, including control of pests and diseases of Asian brassicas.

In order to do update the IPM manual, it is important that I gather some information from you, the Asian brassica growers.

I need all Asian brassica growers to fill in the attached questionnaire, and send it back to me in the self-addressed envelope.

Could you please do this. It is very important. Your name, and the contents of the questionnaire will remain confidential.

I look forward to receiving your completed questionnaire.

Thank you in anticipation.

Yours sincerely

Peter Wright

Plant Pathologist

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Appendix II

Asian Brassica Survey Questionnaire

1. How long have you been growing Asian brassicas?

a. Less than 2 years……..
b. 2-5 years……..
c. 6-10 years…….
d. More than 10 years……..

2. Total area in Asian brassicas last season:
_____ Ha

3. Asian Brassica crops grown last season

a. Chinese broccoli……....
b. Chinese cabbage (Wong bok) ....
c. Bok choy…….
d. Choy sum……....
e. Other……..…….. Specify:
_____

4. Do you monitor your Asian brassica crops for:

a. Diseases……....
b. Insect pests…….…….. .
c. Other……..…….. Specify:
_____

5. List the 5 most prevalent diseases normally seen in your Asian brassicas:

1. _____(most common)
2. _____
3. _____
4. _____
5. _____(least common)

Possible diseases include: Bacterial leaf spot, Blackleg, Black rot, Clubroot, Downy mildew, Head rot, Powdery mildew, Rhizoctonia, Ringspot, Rust, Sclerotinia, Septoria leaf spot, White blister, Virus.

6. Approximate crop damage last season:

Disease: _____Crop damage (%) _____

Disease: _____Crop damage (%) _____

Disease: _____Crop damage (%) _____

Disease: _____Crop damage (%) _____

7. Which diseases did you try to prevent or try to control in your Asian brassicas:

Disease_____

Disease_____

Disease_____

Disease_____

Disease_____

8. Which diseases are the most difficult to control in your Asian brassicas:

Disease_____

Disease_____

9. List the 5 most prevalent insect pests normally seen in your Asian brassicas:

1. _____(most common)
2. _____
3. _____
4. _____
5. _____(least common)

Possible insect pests include: Cabbage grey aphid, Other aphids, Diamondback moth, Earwigs, Greasy cutworm, Leaf miners, Loopers, Nysius, Springtails, Slugs, Tomato fruitworm, White butterfly.

10. Approximate crop damage last season:

Pest: _____Crop damage (%) _____
Pest: _____Crop damage (%) _____
Pest: _____Crop damage (%) _____
Pest: _____Crop damage (%) _____

11. Which insect pests did you try to prevent or try to control in your Asian brassicas:

Pest:_____
Pest:_____
Pest:_____
Pest: _____
Pest:_____

12. Which insect pests are the most difficult to control in your Asian brassicas:

Pest _____
Pest _____

13. Did you scout your crops for pest and/or diseases? Yes…. No….

14. If yes, how often did you scout?

a. At least twice each week…….
b. Once a week…….
c. Twice a month……..
d. Once a month…….

15. Were decisions to control pests/diseases based on scouting information?
Yes…. No….

16. If yes, was the decision to control based on:
a. Just the presence of a pest/disease? …
b. A pest/disease threshold? ……□

17. If no, what were the reasons for deciding to take action to control a disease or pest:
Please give details: _____
_____
_____
_____
_____
_____

18. If you sprayed for caterpillar pests did you use the insecticide rotation strategy for diamondback moth?_____

19. Have you heard about the IPM (integrated pest management) programme for vegetable brassicas?_____

20. Do you use the IPM programme?_____

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

Please send to:

PJ Wright

Crop & Food Research

Cronin Road, RD 1

Pukekohe